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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/030,692   | 01/14/2002  | Hans Rudolf Muller   | EPROV 17            | 8615             |
| 23599 7590 11/16/2007<br>MILLEN, WHITE, ZELANO & BRANIGAN, P.C.<br>2200 CLARENDON BLVD.<br>SUITE 1400<br>ARLINGTON, VA 22201 |             |                      |                     |                  |
| EXAMINER   |             |                      |                     |                  |
| BERCH, MARK L.   |             |                      |                     |                  |
| ART UNIT   |             | PAPER NUMBER         |                     |                  |
| 1624   |             |                      |                     |                  |
| MAIL DATE  |             | DELIVERY MODE        |                     |                  |
| 11/16/2007   |             | PAPER                |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/030,692

Applicant(s)

MULLER ET AL.

Examiner

/Mark L. Berch/

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**Period for Reply**  
-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-19, 29-31, 33-43 and 45-50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-13, 29-31, 33, 34, 37, 40, 42 and 45-49 is/are allowed.
- 6) ☒ Claim(s) 14, 17-19, 30, 35, 36, 38, 39, 41, 43 and 50 is/are rejected.
- 7) ☒ Claim(s) 15 and 16 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-552)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
- Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION*****Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/17/2007 has been entered.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

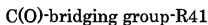
Claims 18 and 50 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The earlier amendment to claim 18 has garbled the claim. It ends with a reference to "a bridging group of a monovalent radical", which makes no sense. A bridging group is a divalent radical. The traverse is unpersuasive. The remarks state: "The bridging group recited at the end of the claim refers to a divalent radical linking the secondary phosphine groups together, which forms the monovalent radical R41 of the ditertiary diphosphine."

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What divalent radical? There is no reference to any such thing in the claim. The terms has no antecedent basis.

The traverse is unpersuasive. The remarks state that the new claim 50 “clarifies” what is intended by the phrase. But claim 50 is different. The claim language of claim 50 refers to “a bridging group present between the CO group and the monovalent radical R41.” (emphasis added). Thus, we have at the right side of XLII:



in which that bridging group has a O, N or C at its left side. Note that the bridging group and R41 are separate items. The bridging group is between R41 and C(O). However, in claim 18, the bridging group is part of the group R41. Thus, claim 50 and claim 18 provide for two different things. As a result, it is unclear what claim 18 intends, because while applicants state that claim 50 sets forth specifically what claim 18 intends, the two clearly provide for something different. To make matters worse, claim 50 (but not claim 18) violates the structural formula. Claim 50 has the bridging group “present between the CO group and the monovalent radical R41”, but the structural formula has C(O) attached directly to the R41. The structural formula does not permit a bridge.

Claim 43 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The “heterocycloaliphatic” claim 43 had been ambiguous. It could mean a) “Cycloaliphatic” substituted by a heteroatom, e.g. amino-cyclohexyl, b) “Cycloaliphatic”

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attached by a heteroatom, e.g. cyclohexyloxy c) a heterocycle attached to an aliphatic group, i.e. Heterocycle-aliphatic? Applicants choose yet another option, which is a "cycloaliphatic" compound as defined above with at least one heteroatom located in the cycle, and has now placed that definition into the claim, removing the ambiguity. However, that is new matter. On what basis was that choice made rather than any other the other three? The choice appears to be completely arbitrary. Applicants previously supplied two references in this regard, but neither one of them uses the term in question. Applicants next pointed to Page 13, lines 19-25. However, the term in question, "heterocycloaliphatic", did not appear on those lines. The term which appear does not have "aliphatic" in it. Further, the terms which do appear are not themselves defined. There are only examples given. Now applicants point to page 12, paragraph 1 and 3, "when read together". This is of no avail. Paragraph 1 discusses heterohydrocarbon, heterocycloaliphatic, heterocycloaliphatic-aliphatic, heteroaromatic, heteroaromatic-aliphatic, and heteroradical. The term "heterocycloaliphatic" is not defined; all we are told is that it falls into the category of heterohydrocarbon. Paragraph 3 gives examples for heterohydrocarbon (which examples do not include the use of the term "heterocycloaliphatic"), and preferred parameters for heteroradicals. The paragraph does not mention heterocycloaliphatic, and hence cannot be said to give any guidance on that term at all. Accordingly there is no descriptive support for the material placed into claim 43. The term could just as well refer to e.g. a cycloalkyl substituted by a heteroatom.

Claims 14, 17-19, 30, 35-36, 38-39, 41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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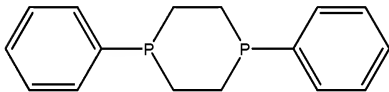
In claims 14, 30, etc., what exactly is a “diphosphine, having tertiary phosphine groups which contain two identical, or different, unsubstituted or substituted hydrocarbon radicals with 1 to 20 carbon atoms.”?

Would that include (t-butyl)PH-PH(t-butyl)? It is a diphosphine and it does have tertiary groups (the t-butyl) and it does have two hydrocarbon radical. Would it include (Methyl)<sub>2</sub>P-P(methyl)<sub>2</sub>? This has of course four hydrocarbon radical, but this embraces two, since the claim says “two” and not “exactly two”. What about (Methyl)P=C=P(methyl) or (Methyl)P=P(methyl) or (Methyl)P=CH-HC=P(methyl).

The earlier traverse was unpersuasive. Applicants stated that what they intended R<sub>2</sub>P-R-PR<sub>2</sub>, where R is a hydrocarbyl group, and to support this applicants say: “according to IUPAC nomenclature under phosphines, tertiary phosphines are characterized by the structure R<sub>3</sub>P, wherein R means a hydrocarbyl group.” But this is contradictory. If a phosphine is R<sub>3</sub>P, wherein R means a hydrocarbyl group, then neither P atoms in R<sub>2</sub>P-R-PR<sub>2</sub> qualifies, since each P has two hydrocarbyl groups, and a third group, the -R-PR<sub>2</sub>, which is not a hydrocarbyl group, since a hydrocarbyl group has just H and C. Applicants cannot point to a definition, and then turn around and propose a structure that violates it. Further, while the terminal R groups are supposed to be hydrocarbons according what applicants say, claim 18 violates this notion by referring to R<sub>41</sub>, which is “a monovalent radical of a chiral ditertiary diphosphine” as potentially having a N atom present! And claim 16 has the bridging group (there called R<sub>6</sub>) which contains an iron atom. How could something which contains an iron atom be called a hydrocarbyl group? A hydrocarbon cannot have a N atom present. Second, even ignoring that, what is the “ditertiary” doing?

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According to applicants reason,  $R_2P-R-PR_2$  would be a diphosphine, a molecule with two phosphine pieces. For all one knows, the tertiary refers to a carbon --- that is, e.g. (t-butyl)P(methyl)-CH<sub>2</sub>-P(methyl)(t-butyl)? This is a diphosphine with the additional feature of having two tertiary carbons. Indeed, since the definition of phosphine which applicants have presented already requires that each P be attached to three carbons, it would be logical to assume that the additional requirement of "ditertiary" must be referring to a tertiary carbon. Third, applicants have selected a molecule with one bridge (the -R-) and two terminal units, the R<sub>2</sub> on each side. But applicants could just as well have chosen a compound with two bridges and one terminal group, e.g.:



(diphenyl diphosphacyclohexane). In addition, applicants have not really eliminated other choices. For example, (Methyl)<sub>2</sub>P-P(methyl)<sub>2</sub>, cited above, is called tetramethyl diphosphine. As evidence, the examiner cites 4133831. See Column 5, structure 6, and the text at lines 46-48 which says, "The phosphine compound of the formula (6) may be selected from, for example, the group consisting of tetramethyl diphosphine", which is structure (6), with all R groups as methyl. Applicants in short have presented no compelling argument in favor of their choice, which appears as arbitrary and in fact in violation of the very reference they have cited for support.

The traverse is unpersuasive. Applicants say that the bridging group R does not have to be a hydrocarbon. But applicants cannot hold to that stance and simultaneously rely on a narrow definition of phosphines which does require hydrocarbon.

Applicants state, "The Office Action **again** repeats various incorrect selections for structures purported to be a ditertiary diphosphine. Structure (a) (t-butyl)PH-PH(t-butyl) is a diprimary diphosphane. Structure (b) (Methyl)<sub>2</sub>P-P(Methyl)<sub>2</sub> is a disecundary diphosphane. Structures (c) (Methyl)P=C=P(Methyl) and (d) (Methyl)P=CH·CH=P(Methyl) contain P/C double bonds (such as imines). Structure (e) (Methyl)P=P(Methyl) has a P/P double bond. Moreover, the Office Action has not provided any evidence that the various speculative structures fall either under the terms "ditertiary" or "diphosphine." No evidence is provided that any of the speculative structures are, if existent, named ditertiary diphosphines."

The examiner is at a loss to understand applicants' nomenclature.

First, applicants draw a non-existent distinction between phosphine and phosphane, saying e.g. "the compound ... is a phosphane and not a phosphine." This is entirely mistaken. The two mean the same. The reference "Phosphine From Wikipedia, the free encyclopedia" is cited which says "Phosphine is the common name for phosphorus hydride (PH<sub>3</sub>), also known by the IUPAC name phosphane". Thus Phosphine = phosphane. Similarly, the reference "Index by Molecular Formula" gives for H<sub>4</sub>P<sub>2</sub>, "Diphosphane; diphosphine", indicating that the two are the same. Likewise, the reference "diphosphane (CHEBI:35880)" lists diphosphine as a synonym. Thus, Diphosphane = diphosphine.

Second, applicants have their adjectives incorrectly understood. Applicants state: "Structure (a) (t-butyl)PH-PH(t-butyl) is a diprimary diphosphane. Structure (b) (Methyl)<sub>2</sub>P-P(methyl)<sub>2</sub> is a disecundary diphosphane." Neither statement is correct.

Phosphane (or phosphine) is PH<sub>3</sub>. "Primary" is one. A primary phosphine has one H replaced on the P. Secondary is two. A Secondary phosphane has two H atoms replaced on



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the P. As evidence, the examiner cites the “phosphine” reference which states this explicitly: “in primary, secondary, and tertiary phosphines, one, two, and three hydrogen atoms have been replaced by organic combining groups.” Thus, in Structure (a) (t-butyl)DPH-PH(t-butyl), as a phosphane, this would be a disecondary diphosphane, because each P has two hydrogens replaced. Similarly, (b) (Methyl)2P-P(Methyl)2 is a ditertiary diphosphane, not a disecondary diphosphane, because each P has had three of its H atoms replaced.

Further, applicants are missing the point that the examiner makes here. The adjective here, tertiary, could refer to the P, but it could just as well refer to the substituent on the P. The t-butyl is a tertiary group; the “t-” in t-butyl stands for tertiary. Thus, in the term “ditertiary diphosphine”, the “tertiary” could be talking about the nature of the P atom, or it could be talking about the nature of the substituent on the P atom. In the former case, then, no, (t-butyl)DPH-PH(t-butyl), is not ditertiary. But in the latter case, (t-butyl)DPH-PH(t-butyl) is ditertiary because it has two tertiary substituents (t-butyls) present in the molecule.

As further evidence, the examiner cites the Liddle reference, which says in the abstract “... the known ditertiary diphosphane (Mes2P)2 ...”. Therefore, applicants statement “Structure (b) (Methyl)2P-P(Methyl)2 is a disecondary diphosphane” is mistaken.

In addition the examiner cites the Andrews reference, which refers to “the disecondary diphosphane, 4”. As can be seen from the structure directly above, compound 4 has the form RPH-PHR. Therefore applicants statement “Structure (a) (t-butyl)DPH-PH(t-butyl) is a diprimary diphosphane” is likewise mistaken.

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Third, applicants state: "Structures (c) (Methyl)P=C--P(Methyl) and (d) (Methyl)P=CH-CH=P(Methyl) contain P/C double bonds." This is correct, but so what? As noted above, the primary/secondary/tertiary distinction is based solely on the number of H atoms removed.

Next, applicants state, "Moreover, it is important to note that the ditertiary diphosphines used in the process of this invention are ligands forming metal complexes with 5- to 10-membered rings. Absolutely none of the structures (a) to (e) can form 5- to 10-membered rings due to the number of atoms in the chain (2 or 3) or due to the stiffness of the P/C double bonds in structure (d)."

Except for claim 19, this is not true for the claims rejected above. These claims have no such ring requirements. The ligands are not even required to be bidentate.

With regard to claim 19, it is agreed that compounds with a direct P-P bond will not form such a ring. However, the issue would still arise with (Methyl)P=CH-CH=P(Methyl), which should be able to form such a ring. And even if it did not, (Methyl)P=CH-(CH<sub>2</sub>)<sub>1-2</sub>-CH=P(Methyl) would present the same issue and surely will be able to form such a ring.

In addition, there is the compound with two bridges and one terminal group, drawn above. That is, applicants have assumed that the compound must be of the form having each P attach to one bridge atom and two terminal groups. Yet, there is no apparent reason why a compound with two bridges and one terminal group would not also qualify.

In response, applicants earlier stated, "However, nothing in the record would lead one of ordinary skill in the art to take the depicted structure as a ligand of the present claims. One of ordinary skill in the art would have readily understood that in the depicted structure the complexing P atoms are opposite and cannot form a ring with the metal

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atom.” Applicants give no reason at all for such conclusions, and the statement simply isn’t true. The compound listed, called diphenyl diphosphacyclohexane, appears to meet the definition of a ditertiary diphosphine, and is in fact a known ligand for forming catalytic metal complexes. The examiner cites 5028734 (see last species in claim 4) and 4739110 (see column 3, line 42) and 5869738 (see column 9, lines 48-49), merely as some examples of this molecule, being taught as a ligand on metals. The examiner understands from the remarks that applicants do not intend such compounds. However, such compounds do meet the claim language, they will form complexes even for the requirements of claim 19, and hence are embraced. When the claim embraces material which applicants do not intend, then the “the subject matter which the applicant regards as his invention” requirement of the statute has not been met.

The present claim language changes little. The word “ditertiary” is now gone (except in claim 35), replaced by “tertiary”, but it doesn’t seem that this makes much difference. There are now required to be two optionally substituted hydrocarbon radicals, but the examples which the examiner put forth above generally have at least two such radicals.

The examiner believes it would be helpful if applicants were to use a structural formula to convey what they intend, because at the present time, the claim language is unclear and does not line up with what applicants state that they intend. Applicants have stated that they intend  $R_2P-R-PR_2$ , where R is a hydrocarbonyl group. But their current claim language simply does not convey this. To begin with, substituted a group has 5 unsubstituted hydrocarbon radicals, while claim 14 requires only two, but those can be optionally substituted. Second, that structure has exactly one bridge between the P atoms. But the claim language has no such requirement. The claim language is consistent with a

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structure having no bridges e.g. tetramethyl diphosphine  $(\text{Methyl})_2\text{P}-\text{P}(\text{methyl})_2$  or having two bridges e.g. diphenyl diphosphacyclohexane, depicted above. The other problem has to do with the term “tertiary”. In a compound having hydrocarbon group and having a P atom, the “tertiary” could apply to either the P atom (to which the hydrocarbon is attached), or to a hydrocarbon group (to which the P is attached). The examiner understands from the remarks that applicants intend to the tertiary to apply only to the P atom, the claim does not state that. Further, there is the problem discussed above that applicants have an incorrect view of the meaning of the term “tertiary”. Thus, what applicants have stated that  $(\text{Methyl})_2\text{P}-\text{P}(\text{methyl})_2$  is a secondary phosphine, the art calls it a tertiary phosphine, as noted above.

Claims 14, 17-19, 30, 35-36, 38-39, 41 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

This new claim language is not supported by the specification. Many diphosphine examples are seen on the indicated pages, but every single one has 5 optionally substituted hydrocarbon radicals. Can applicants even draw such a diphosphine that has only two?

Claim 35 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The “ditertiary” was removed from claim 14, but remains in claim 35, which depends on claim 14.

*Claim Objections*

Claims 15-16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, THIS ACTION IS MADE FINAL even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to /Mark L. Berch/ whose telephone number is 571-272-0663. The examiner can normally be reached on M-F 7:15 - 3:45.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James O. Wilson can be reached on (571)272-0661. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark L. Berch/  
Primary Examiner  
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11/16/2007